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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,186	01/26/2004	Toru Tsukada	Q79580	6504

65565 7590 01/11/2008

SUGHRUE-265550
2100 PENNSYLVANIA AVE. NW
WASHINGTON, DC 20037-3213

EXAMINER	
KIM, CHONG HWA	
ART UNIT	**PAPER NUMBER**
3682	

MAIL DATE	DELIVERY MODE
01/11/2008	PAPER

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The time period for reply, if any, is set in the attached communication.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/763,186
Filing Date: January 26, 2004
Appellant(s): TSUKADA ET AL.

Daniel V. Williams
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/17/07 appealing from the Office action mailed 7/25/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

3,643,521	Nilsson	2-1972
888,619	Kelly	5-1908
JP 04046216	Chiba (Engl. Trans. Incl.)	2-1992

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 17-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nilsson, U.S. Patent 3,643,521 in view of Chiba, JP 04046216 A (English translation included).

Nilsson shows, in Fig. 2, a feed screw device comprising;

a screw shaft 10;

a nut member 11 threadably engaging an outer peripheral surface of the screw shaft;

a lubricant supply device 17, at least a portion 18 of the lubricant supply device contacting the screw shaft;

a housing member 22 which is secured to the nut member and houses the lubricant supply device, the nut member being positioned outside of the housing member;

wherein the housing member/retaining ring, comprising a cylindrical portion 27 that extends away from the nut member and an end face (the vertical portion of 22) that covers an axial end (the right side end) of the lubricant supply device, is disposed to project from an axial end surface of the nut member and along an outer circumferential surface of the lubricant supply device, the outer circumferential surface extending in a longitudinal direction of the screw shaft and beyond the end face of the nut member;

wherein the portion 18 of the lubricant supply device contacts a threaded groove of the screw shaft;

a means (screw) for securing the housing to the nut member; and

wherein the means for securing comprises a screw/fastener threaded to contact at least a portion of the nut member and into at least a portion of the housing;

but fails to show a side that extends radially inward to cover the axial end portion of the lubricant supply device and the lubricant supply device containing a lubricant.

Chiba shows, in Fig. 1, a housing member 8 and 9 which is secured to a nut member 2 and houses a lubricant supply device 7 containing a lubricant oil, the nut member being positioned outside of the housing member, wherein the housing member includes a side 9 that extends radially inward to cover an axial end portion of the lubricant supply device, the axial end portion of the lubricant supply device faces in the longitudinal direction away from the nut member.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the housing member with the sealing member of Nilsson with the dust-proofing device as taught by Chiba in order to improve the durability and reliability of the feed screw as described by Chiba in "Problems to be solved by the invention".

Claims 17-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelly, U.S. Patent 888,619 in view of Chiba, JP 04046216 A.

Kelly shows, in Figs. 1-3, a feed screw device comprising;

a screw shaft (1);

a brush (13); and

a nut member (7) threadably engaging an outer peripheral surface of the screw shaft;

but fails to show a lubricant supply device being housed in a housing member that is secured to the nut.

Chiba teaches a linear rail guide, as shown in Fig. 1, comprising a dust-proofing apparatus (6) having a housing (8 and 9) and a lubricant supply device (7) containing a lubricant oil; wherein the housing is secured to a nut member (2) and houses the lubricant supply device; wherein the nut member is positioned outside of the housing; wherein the housing is disposed to project from an axial end surface of the nut member and along an outer surface of the lubricant supply device; wherein the outer surface extending in a longitudinal direction of the rail guide; wherein the housing includes a side (9) that extends radially inward to cover an axial end portion of the lubricant supply device, the axial end portion of the lubricant supply device faces in the longitudinal direction away from the nut member; wherein a means (11) for securing the housing to the nut member comprises a screw threaded to contact at least a portion of the nut member and into at least a portion of the housing (see dotted lines in Fig. 1).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made modify the dirt or grit remover (brush) of Kelly with the dust-proofing apparatus as taught by Chiba in order to improve the durability and reliability of the feed screw as described by Chiba in "Problems to be solved by the invention".

As to the matter of the shape of housing (the retaining ring as recited in claims 31-34), the housing (8 and 9) of Chiba could be formed in a ring shape when one of ordinary skill in the art modifies the shape of the housing (8 and 9) to surround the screw shaft of Kelly and such shape forming would be obvious.

(10) Response to Argument

I) Rejection under 35 USC 103(a) over Nilsson in view of Chiba.

Claims 17-36, 46, and 47

A) There is no motivation to modify Nilsson with Chiba to include a side that covers an axial end of the lubricant supply device.

It is the Examiner's position that there are reasons to modify Nilsson's sealing member and the housing. First, the term "lubricant supply device" as recited in all of the independent claims is broadly interpreted as any device that is associated with supplying (or moving) the lubricant. It is not until dependent claims 37-45 that the "lubricant supply device" explicitly contains a lubricant oil or grease. Therefore, it is the Examiner's view that the sealing member 17 of Nilsson can be construed as being a "lubricant supply device" as recited in the independent claims since the sealing member moves or supplies the lubricant along the groove as the nut member 11 is displaced axially. The sealing member of Nilsson acts as a seal that prevents the lubricant from escaping and the foreign objects from entering the feed screw device. Although Nilsson does not describe any shortcomings of the sealing member, any one of ordinary skill in the art of linearly translating device, such as the feed screw of Nilsson, understands that the rubber or synthetic resin material (see col. 1, line 45) of Nilsson would not last long, especially on a surface that may contain hardened foreign materials solidified thereon, not to mention the decaying process caused by environmental factors such as heat, radiation, temperature variation, and etc. Furthermore, due to the resiliency of the sealing member of Nilsson, there could be a possibility of solidified foreign material, that is not

completely wiped clean from the screw shaft, entering the nut member of the feed screw device.

Chiba discusses such problems as stated above on page 3 of the English translation. Under the heading "Prior art", on page 3, lines 5-13, Chiba acknowledges the existence of a dust-proofing wiper seal being "made of a special synthetic rubber with high abrasion resistance." Chiba further discusses that the rubber seals "cannot be used in locations with an extremely bad usage environment," because "fine shavings, tiny particles and the like cannot be removed." Furthermore, Chiba is concerned, as described on page 4 of the English translation under the heading of "Problems to be solved by the invention", with "the minute foreign matter, (wood) scraps and the like" (see page 6, line 1) penetrating the ball groove inside the nut device 2.

In order to improve the durability and reliability of the linear translating device, Chiba provides a lubricant supply device 7 inside the housing 9 and 8. The lubricant supply device 7 is a felt that contains the lubricant oil. And the housing includes a side 9 that extends radially inward to cover the axial end of the felt.

Although Chiba does not explicitly discuss specifically the problems in Nilsson's invention, Chiba's discussion concerning the shortcomings of the rubber seal appears to be significantly relevant to the inherent problems of the rubber sealing member of Nilsson.

It is understood by an ordinary skill in the art that if only the sealing member of Nilsson is modified by the felt of Chiba that is much weaker than the sealing member, then such modification would destroy the intent of Nilsson's invention. However, such is

not the case, since it is the housing member 22 and the sealing member 17 that are being modified with the dust-proofing device made of the housing 8 and 9 and the felt 7 containing the lubricant oil as taught by Chiba. When modified, the side 9 of the housing is required in order to keep the felt 7 from being loosely contacting the surface of the screw or being detached from the nut member even if the felt would have been held by the screw as shown in Fig. 2 of Nilsson. Thus, by modifying the housing and the sealing members of Nilsson with the dust-proofing device as taught by Chiba, the durability and reliability of the feed screw is improved as described by Chiba on page 4, lines 13-14.

II) Rejection under 35 USC 103(a) over Nilsson in view of Chiba.

Claims 37-45.

A) There is no motivation to modify Nilsson with Chiba to include a lubricant supply device or means for storing a lubricant.

Again, the term "lubricant supply device" as recited in all of the independent claims is broadly interpreted as any device that is associated with supplying (or moving) the lubricant. It is not until dependent claims 37-45 that the "lubricant supply device" explicitly contains a lubricant oil or grease. Therefore, it is the Examiner's view that the sealing member 17 of Nilsson can be construed as being a "lubricant supply device" as recited in the independent claims since the sealing member moves or supplies the lubricant along the groove as the nut member 11 is displaced axially.

In response to the appellant's argument that modifying the sealing member of Nilsson to supply any additional lubrication is simply not needed, the Examiner agrees

with the appellant in a sense that the sealing member does not need extra friction modifier between the sealing member and the groove of the screw since the friction modifier is provided in the chamber 23. However, as it will be discussed further in detail, the oil of Chiba as interpreted as a "lubricant" is not an additional friction modifier, but a lubricant that is an inherent characteristic of an oil.

The word "lubricant" can be applied to any substance that can be utilized as a friction modifier. Even water can be viewed as a lubricant. And certainly, when a substance is described as an oil, it can be construed as a lubricant whether the substance is used for a human consumption or any other purpose. Perhaps the oil as taught by Chiba is not used as a friction modifier. However, oil has the natural substance that reduces friction. Therefore, it can be viewed as a lubricant. In addition, the appellant's claims do not recite any limitations regarding the application of the lubricant in any capacity. The claims simply recites that the "lubricant supply device" contacts the screw shaft and covered by the housing member.

III) & IV) Rejection under 35 USC 103 (a) over Nilsson in view of Yabe.

Claims 17-47.

The Examiner withdraws the rejection.

V) & VI) Rejection under 35 USC 103 (a) over Nilsson in view of Asai.

Claims 17-47.

The Examiner withdraws the rejection.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

This examiner's answer contains a new ground of rejection set forth in section **(9)** above. Accordingly, appellant must within **TWO MONTHS** from the date of this answer exercise one of the following two options to avoid *sua sponte* **dismissal of the appeal** as to the claims subject to the new ground of rejection:

(1) **Reopen prosecution.** Request that prosecution be reopened before the primary examiner by filing a reply under 37 CFR 1.111 with or without amendment, affidavit or other evidence. Any amendment, affidavit or other evidence must be relevant to the new grounds of rejection. A request that complies with 37 CFR 41.39(b)(1) will be entered and considered. Any request that prosecution be reopened will be treated as a request to withdraw the appeal.

(2) **Maintain appeal.** Request that the appeal be maintained by filing a reply brief as set forth in 37 CFR 41.41. Such a reply brief must address each new ground of rejection as set forth in 37 CFR 41.37(c)(1)(vii) and should be in compliance with the other requirements of 37 CFR 41.37(c). If a reply brief filed pursuant to 37 CFR 41.39(b)(2) is accompanied by any amendment, affidavit or other evidence, it shall be treated as a request that prosecution be reopened before the primary examiner under 37 CFR 41.39(b)(1).

Extensions of time under 37 CFR 1.136(a) are not applicable to the TWO MONTH time period set forth above. See 37 CFR 1.136(b) for extensions of time to reply for patent applications and 37 CFR 1.550(c) for extensions of time to reply for ex parte reexamination proceedings.

Respectfully submitted,

chk

CHONG H. KIM
PRIMARY EXAMINER

A Technology Center Director or designee must personally approve the new ground(s) of rejection set forth in section (9) above by signing below:

APPROVED BY
DONALD T. HAJEC
DIRECTOR, TECHNOLOGY CENTER 3600

Conferees:

Richard Ridley, SPE

Meredith Petravick, Appeals Specialist

PTO 08-1342

CC = JP
19920217
Kokai
04046216

STRAIGHT-LINE GUIDE DUST-PROOFING APPARATUS
[Chokusen annai no bojin sochi]

Osamu Chiba

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. DECEMBER 2007
TRANSLATED BY: THE MCELROY TRANSLATION COMPANY

PUBLICATION COUNTRY	(19):	JP
DOCUMENT NUMBER	(11):	04046216
DOCUMENT KIND	(12):	Kokai
PUBLICATION DATE	(43):	19920217
APPLICATION NUMBER	(21):	2149597
APPLICATION DATE	(22):	19900607
INTERNATIONAL CLASSIFICATION[5]	(51):	F 16 C 29/06 29/08
INVENTOR	(72):	Osamu Chiba
APPLICANT	(71):	Yamaha Corporation
TITLE	(54):	STRAIGHT-LINE GUIDE DUST-PROOFING APPARATUS
FOREIGN TITLE	[54A]:	Chokusen annai no bojin sochi

Claim

A straight-line guide dust-proofing apparatus characterized in having:

a rail,

a straight-line guide supported to be able to slide by the rail and that travels on the rail,

an oil coating member affixed to at least one side surface in the direction of travel of the aforementioned straight-line guide and that supplies oil to the rail surface,

and a removal member affixed to the aforementioned side surface in the direction of travel of the straight-line guide and that slides against the aforementioned rail surface.

Detailed explanation of the invention

Industrial application field

The present invention relates to a straight-line guide dust-proofing apparatus which improves the durability of the straight-line guide by supplying oil to the rail surface (guide surface), and trapping and breaking down shavings and the like.

Prior art

Previously, machine tools for cutting lumber or the like and machinery that operates in a straight line as with industrial robots or the like have used a straight-line guide (linear motion bearing) system that moves reciprocatingly on a rail.

As shown in Figure 2 and Figure 3, roller guide (21), which is a type of straight-line guide, is mounted to straddle a rail (22) to be able to travel on rail (22).

Roller guide (21) has a gate-type block (23) which is mated to straddle rail (22). Raceway grooves (24) in 4 lines are cut in the direction rail (22) extends in the opposing surfaces of block (23) and rail (22),

that is, the top surface of rail (22) and the side surface and the inside surface opposite it of block (23). Block (23) then travels on rail (22) by balls (25) rolling inside raceway grooves (24). In this case, a row of balls (25) is held and circulated in ball groove (28) of block (23) by a holder (26) and an end plate (27).

A lubricant (grease) is also supplied from a grease nipple (29) to ball groove (28).

To prevent dirt or foreign matter from penetrating to the guide surface between roller guide (21) and rail (22), a dust-proofing wiper seal (30) and a side seal (31) are attached. Seals (30) and (31) are made of a special synthetic rubber with high abrasion resistance.

However, with dust-proofing using only such synthetic rubber seals (30) and (31), roller guide (21) cannot be used in locations with an extremely bad usage environment. That is, seals (30) and (31) remove dirt and foreign matter by being tightly affixed to the surface of rail (22). Therefore, while large foreign matter and scraps can be removed, fine shavings, tiny particles and the like cannot be removed.

So, straight-line guide dust-proofing apparatuses as shown in Figure 4 or Figure 5 have been proposed to withstand use in such locations with an extremely bad usage environment.

In Figure 4, (41) is a bellows-type cover.

One end of cover (41) is affixed to a side end of straight-line guide (42), and the other end to the end of rail (43). The middle portion of cover (41) is formed with a telescoping bellows. Therefore, when straight-line guide (42) travels on rail (43), cover (41) telescopes in the direction of the arrows in the figure to cover the surface of rail (43).

And in Figure 5, (51) is a telescope-type cover made of stainless steel.

One end of cover (51) is affixed to an end of rail (52), and the other end to a side surface of straight-line guide (53). The middle part of cover (51) is constituted with multiple cylindrical bodies of different diameters.

Therefore, the cylindrical portions of cover (51) overlap as straight-line guide (53) travels and telescope overall.

Problems to be solved by the invention

However, in a dust-proofing apparatus using such a conventional bellow-type cover or telescope-type cover, the space inside the cover performs a pumping action due to travel of the straight-line guide, that is, telescoping of the cover, and minute foreign matter, scraps and the like are sucked in with air through the small gap at the bottom of the cover.

The result is that the minute foreign matter, scraps and the like penetrate to the ball groove inside the straight-line guide or to the guide surface and adhere, with the result that they soak up the grease, and the problem occurs that lubrication becomes unsatisfactory. Wear of the balls and rail occurs. Durability and reliability of the straight-line guide are insufficient.

So, the objective of the present invention is to provide a straight-line guide dust-proof apparatus that can improve the durability and reliability of the straight-line guide.

Means to solve the problems

The present invention is a straight-line guide dust-proofing apparatus having a rail, a straight-line guide supported to be able to slide on the rail and that travels on the rail, an oil coating member affixed to at least a side surface in the direction of travel of the aforementioned straight-line guide and that supplies oil to the rail surface, and a removal member affixed to the aforementioned one side surface in the direction of travel of the straight-line guide and that slides against the aforementioned rail surface.

Operation

In the straight-line guide dust-proofing apparatus pertaining to the present invention, when the straight-line guide travels on the rail, oil is supplied and the rail surface is coated by the oil coating member. The result of this is that an oil film is formed on the rail surface and shavings and the like are dissolved in the oil. Therefore, minute foreign matter, scraps and the like adhered to the oil film on the rail surface can easily be removed by the removal member moving by sliding against the rail surface. Even if the foreign matter, scraps and the like penetrate to the straight-line guide or the guide surface of the rail, because the foreign matter or the like is altered or broken down by the oil, it is hard for it to cause wear of the balls, etc.

Application example

Below, an application example pertaining to the present invention is explained referencing a figure.

Figure 1 is an exploded oblique view showing a straight-line guide dust-proofing apparatus pertaining to an application example of the present invention.

In this figure, (1) is a rail laid on a machine tool table, for example. On rail (1), a straight-line guide (a roller guide, for example) (2) is supported to be able to slide. Straight-line guide (2) is disposed to be able to travel on rail (1) along rail (1). Specifically, gate-shaped straight-line guide (2) is disposed to straddle anvil-shaped cross section rail (1).

Straight-line guide (2) has a cross-sectional gate-shaped block (3), and an end plate (4) affixed to one end surface of block (3) (one side surface in the direction that rail (1) extends). Moreover, a ball groove is formed in block (3), and multiple balls are circulated and held in the ball groove. (5) is a grease nipple that supplies grease to the ball groove.

A dust-proofing apparatus (6) to prevent penetration of foreign matter, wood scraps and the like to the guide surface is then attached to the side surface in the direction of travel of straight-line guide (2).

Dust-proofing apparatus (6) has felt (7), which is an oil coating member, a felt housing (8) that holds felt (7), and a wiper (9)

Felt (7), felt housing (8) and wiper (9) are each of the same shape as aforementioned straight-line guide (2), that is, a gate shape, and are disposed to straddle rail (1).

Felt (oil coating member) (7) is a prescribed thickness, and is a member with a square bracket shape (gate shape) slightly smaller than felt housing (8) which is mated to and held in felt housing (8). The inner wall shape of felt (7) is formed approximately the same as the outer wall shape of rail (1), and the inner wall surface of felt (7) is forcibly slid along the outer surface of rail (1).

Felt housing (8) is a square bracket-shaped member and has an oil channel on the inside. Oil supplied from the outside through a tube (10) can then be supplied to felt (7) through the oil channel.

Wiper (9) is formed with sheet stock with approximately the same square bracket-shape, and its inner wall is formed to slide against the surface of aforementioned rail (1). When wiper (9) slides on rail (1), it can remove minute foreign matter, wood scraps and the like adhered to the surface of rail (1).

Moreover, wiper (9) holds felt housing (8) and is affixed at 4 places by screws (11) on the side surface (end plate (4)) in the direction of travel of straight-line guide (2).

Straight-line guide (2), to which dust-proofing apparatus (6) pertaining to the constitution above is attached, is mated to and slides on rail (1). The result is that the oil impregnating felt (7) is applied to the entire surface of rail (1) and an oil film of a prescribed thickness is always formed.

Because an oil film is formed on the surface of rail (1), shavings and the like that drop onto the surface of rail (1) are trapped, altered or broken down in the oil film.

The result is that even minute foreign matter, wood scraps and the like wetted by the oil and adhered on rail (1) can easily be removed (scraped off) from the surface of rail (1) by the sliding of wiper (9). This is because the foreign matter, scraps and the like readily adhered to wiper (9). Moreover, the foreign matter, such as scraps, that is scraped off will be accumulated at the end of rail (1).

The result is that minute foreign matter, wood scraps and the like will not penetrate to the guide surface or ball groove of straight-line guide (2). And even if they should penetrate, the scraps and the like are altered or degenerated by the oil, so they do not soak up the grease and no wear is caused to the balls or rail (1).

The structure of the dust-proofing apparatus pertaining to this application example is also simpler than a conventional dust-proofing apparatus (dust-proof cover), so it is inexpensive and requires little space for attaching to a straight-line guide.

Moreover, in this application example, the felt is held by a felt housing, but if the felt (oil coating member) itself is impregnated with a large quantity of oil, a felt housing is unnecessary.

The cross-sectional shape of the rail is also not limited to that in the aforementioned application example, and the balls (the rolling bodies could also be cylindrical rollers or needle-shaped rollers) in the roller guide, in addition to a circulating type, could also be a non-circulating type.

[The invention] is also not limited to roller bearings and can be applied to slide bearings.

Effects of the invention

As explained above, with the straight-line guide dust-proofing apparatus pertaining to the present invention, sufficient dust-proofing effects can be obtained even against minute foreign matter, scrapings and the like, and the durability and reliability of the straight-line guide can be improved.

Brief description of the figures

Figure 1 is an exploded oblique view of a straight-line guide dust-proofing apparatus pertaining to an application example of the present invention.

Figure 2 is a left side view thereof showing a cut-away part of a conventional straight-line guide.

Figure 3 is a front view thereof showing a cutaway part of a conventional straight-line guide.

Figure 4 is an oblique view showing a conventional straight-line guide dust-proofing apparatus.

Figure 5 is an oblique view showing another example of a conventional straight-line guide dust-proofing apparatus.

1 rail,

2 straight-line guide,

6 dust-proofing apparatus,

7 felt (oil coating member),

9 wiper (removal member).

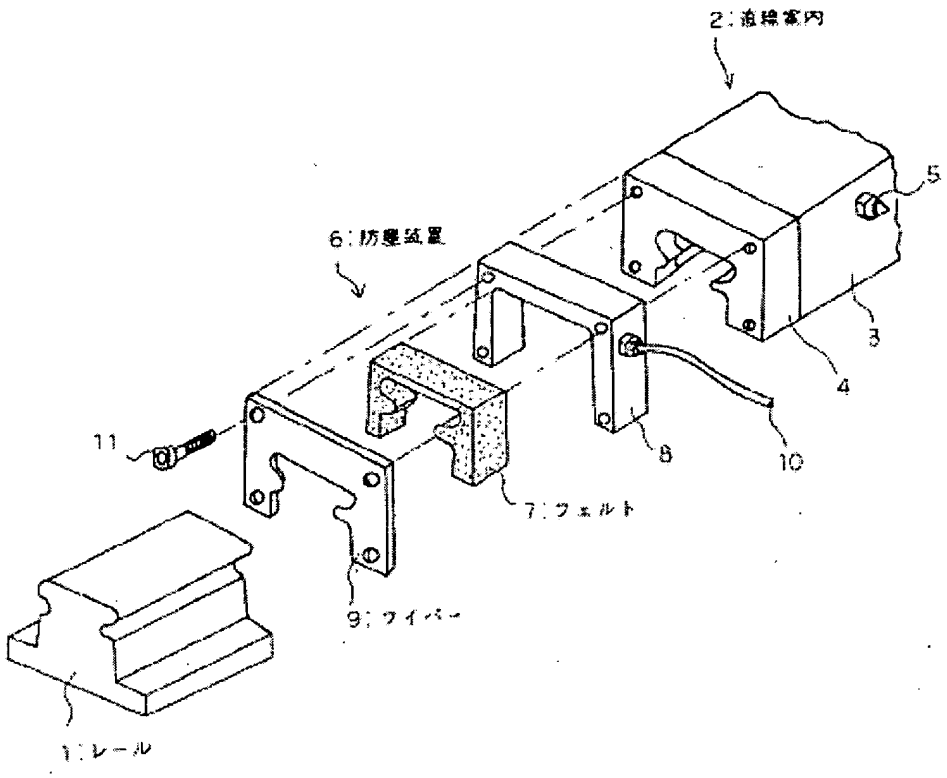

Figure 1. Exploded oblique view of dust-proofing apparatus pertaining to an application example

Key:
1 Rail
2 Straight-line guide
6 Dust-proofing apparatus
7 Felt
9 Wiper

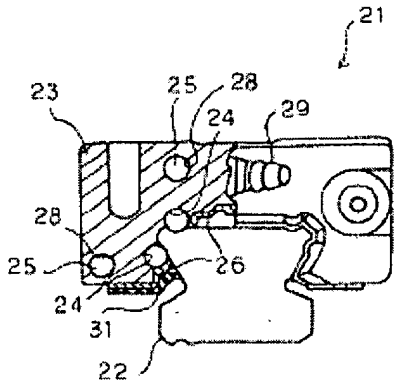

Figure 2. Partial cutaway side view of conventional roller guide

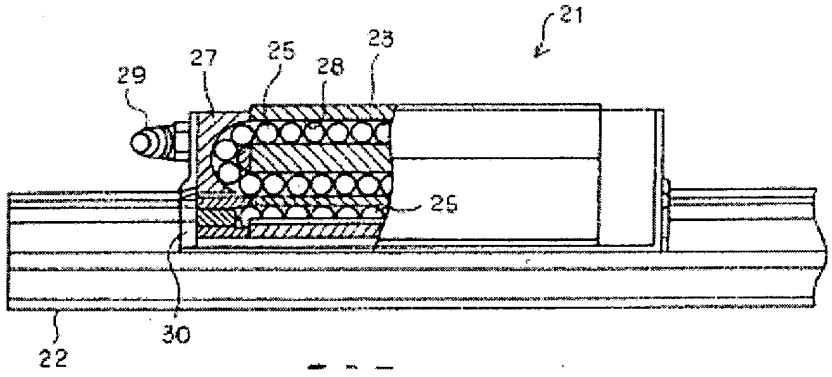

Figure 3. Partial cutaway front view of conventional roller guide

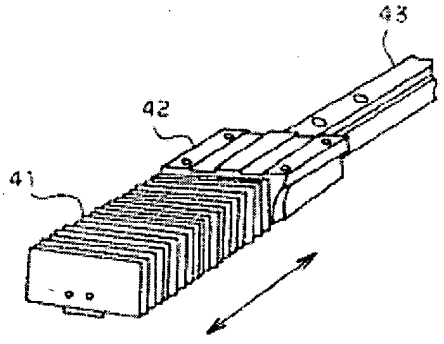

Figure 4. Oblique view of conventional bellows-type cover

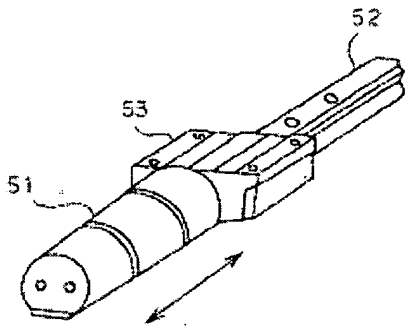

Figure 5. Oblique view of conventional telescope-type cover